Name:

at1118paper: Complete the Square (v404)

Example

By completing the square, find both solutions to the given equation:

$$x^2 - 36x = -308$$

Add $\left(\frac{-36}{2}\right)^2$, which equals 324, to both sides of the equation.

$$x^2 - 36x + 324 = 16$$

Factor the left side.

$$(x - 18)^2 = 16$$

Undo the squaring. We need to consider both $\pm\sqrt{16}$.

$$x - 18 = -4 \quad \text{or} \quad x - 18 = 4$$
$$x = -22 \quad \text{or} \quad x = -14$$

Question 1

By completing the square, find both solutions to the given equation:

$$x^2 + 20x = 429$$

$$x^2 + 20x + 100 = 529$$
$$(x + 10)^2 = 529$$
$$x + 10 = \pm 23$$
$$x = -33 \quad \text{or} \quad x = 13$$

Question 2

By completing the square, find both solutions to the given equation:

$$x^2 - 24x = 585$$

$$x^2 - 24x + 144 = 729$$
$$(x - 12)^2 = 729$$
$$x - 12 = \pm 27$$
$$x = -15 \quad \text{or} \quad x = 39$$

Question 3

By completing the square, find both solutions to the given equation:

$$x^2 + 48x = 1825$$

$$x^2 + 48x + 576 = 2401$$
$$(x + 24)^2 = 2401$$
$$x + 24 = \pm 49$$
$$x = -73 \quad \text{or} \quad x = 25$$

Question 4

By completing the square, find both solutions to the given equation:

$$x^2 - 56x = 177$$

$$x^2 - 56x + 784 = 961$$
$$(x - 28)^2 = 961$$
$$x - 28 = \pm 31$$
$$x = -3 \quad \text{or} \quad x = 59$$

Question 5

By completing the square, find both solutions to the given equation:

$$x^2 - 22x = 104$$

$$x^2 - 22x + 121 = 225$$
$$(x - 11)^2 = 225$$
$$x - 11 = \pm 15$$
$$x = -4 \quad \text{or} \quad x = 26$$

Question 6

By completing the square, find both solutions to the given equation:

$$x^2 + 14x = 1107$$

$$x^2 + 14x + 49 = 1156$$
$$(x + 7)^2 = 1156$$
$$x + 7 = \pm 34$$
$$x = -41 \quad \text{or} \quad x = 27$$